

## DOES THE PHASMID *EURYCANTHA CALCARATA* LUCAS, 1869 (PHASMIDA: PHASMATIDAE) OCCUR IN AUSTRALIA?

G.B. MONTEITH<sup>1</sup> and C.F. DEWHURST<sup>2</sup>

<sup>1</sup>Queensland Museum, PO Box 3300, South Brisbane, Qld 4101

<sup>2</sup>PNG Oil Palm Research Association Inc., Dami Research Station, PO Box 97, Kimbe,  
West New Britain, Papua New Guinea

### Abstract

The New Guinea pest phasmid *Eurycantha calcarata* Lucas is listed from Australia on the basis of very old specimens in European museums labelled 'Thursday Island' and 'Endeavour River'. These specimens have no supporting documentation and passed through the hands of dealers at a time when those ports were trading centres for New Guinea ships. Intensive modern collecting has not confirmed the species at either locality. It is recommended that it be excluded from the native Australian fauna and that Australian pet trade livestock be subject to quarantine action.

### Introduction

The phasmid genus *Eurycantha* Boisduval, 1835, includes large, heavy-bodied, flightless, spiny stick-insects from the New Guinea region. Males have powerful opposable spurs on the hind legs, used in defence. Females have a rigid, projecting ovipositor. Their impressive appearance means they are often illustrated and discussed in the semi-popular literature and *E. calcarata* Lucas, 1869 (Figs 1-2) has entered the pet trade in the northern hemisphere under the common name Giant Spiny Stick Insect (Brock 1992, 1999). The eggs of *E. calcarata* are advertised for sale by mail order by many non-Australian hobbyist websites, though their import into Australia is illegal without a valid import permit (*Quarantine Act 1908 (Sections 5(1) and 13(1)(d), (e) and (f)), Quarantine Proclamation 1998 (Part 6, Division 2, Section 37)*). As with most phasmids, they feed on many plant species and some have become pests of tropical crops (PNGOPRA 1990, Kumar 2001).

*Eurycantha* is one of a complex of genera of phasmids of similar body form from the SW Pacific, popularly called 'tree lobsters'. They have been lumped together as the subfamily Eurycanthinae, which recently has been shown on morphological and molecular grounds to be polyphyletic but adaptively convergent in form (Buckley *et al.* 2008). *Eurycantha* species, however, form a natural group and are geographically circumscribed. There are currently 10 species recognised (Brock 2011, van Herwaarden 1998), all from the island of New Guinea and/or adjacent islands and archipelagos, extending as far east as the Solomon Islands. All were described more than 100 years ago and most published locality records for them are imprecise, usually expressed as a land mass or political unit rather than as discrete localities.

Kirby (1904) described *Eurycantha sifia* Kirby, based on two males and two females, labelled 'Thursday I', in the Natural History Museum, London. This was the first putative record of *Eurycantha* from Australian territory and subsequent checklists, catalogues and textbooks included it as Australian (Key 1991, Vickery 1983, Balderson *et al.* 1998). Brock and Hasenpusch

(2007) examined the types of *E. sifia* and synonymised it under *E. calcarata*, a species described from the Solomon Islands and recorded from the Bismarck Archipelago and (arguably) the New Guinea mainland (Brock 2011); they did not report further Australian specimens. Later, Brock and Hasenpusch (2009) reported '*museum specimens from the Endeavour River in far north Queensland*' and placed map distribution points on Thursday Island and, on the Australian mainland, at Cooktown on the Endeavour River. The Australian Faunal Directory website (2011) lists both localities but with reservations as follows: '*Australian records are probably spurious*'. It includes an *in litt.* quote from Paul Brock that one interpretation is that:

*'Thursday Is and/or Endeavour River are valid locations, there has been little collecting in either and the species may be localised. The Endeavour River is a long stretch of seldom visited land and the insects are nocturnal, so would not easily be found.'*

The Australian Quarantine Inspection Service website takes a harder line:

*'The erroneous publication of the species in "The Complete Field Guide to Stick and Leaf Insects of Australia" led many to argue it is present in Australia. There are no collections from Australia in over 100 years. Those labelled as Australian from the 1800s in the Natural History Museum, London and Vienna Natural History Museum are dubious. This species has not been found during extensive field collections in North Queensland. Pending independent confirmation of E. calcarata in the wild in Australia, it is considered an exotic species' (AQIS 2011).*

Despite these reservations on the legitimacy of the early records of *Eurycantha* from Australia, live *E. calcarata* appeared for sale in the Australian pet trade in early 2010. Enquiries revealed unsubstantiated claims that the original breeding stock had been collected by unnamed 'backpackers' at a locality described as 'near Hopevale', which is on the Endeavour River. If true, this claim verifies 100+ year old records based on isolated, poorly documented specimens in European museums and validates the natural occurrence of a known pest insect in Australia, despite the fact that it has never appeared in a pest situation in Australia. If false, this claim perpetuates a scientific fraud that the species is endemic to Australia and prevents quarantine action being taken against the possible illegal introduction of an important pest into Australia.

The purpose of this paper is to examine the validity of the old specimens in the two European museums and to assess the likelihood that *E. calcarata* could have persisted uncollected for 100+ years at Thursday Island or the Endeavour River. This is assessed in the light of our knowledge of the geography and biogeography of the region and of the extent of collecting that has occurred there.



1



2

**Figs 1-2.** *Eurycantha calcarata* Lucas. (1) male; (2) female. (Photos from PaDIL website with permission).

### **The geographical/political/quarantine context of the region**

Cape York Peninsula is the northernmost part of the Australian mainland and is separated from the southern coast of mainland New Guinea by the 150 km wide Torres Strait. Thursday Island is just off the northern tip of this Peninsula and the Endeavour River exits to the sea 600 km further south on its east coast. Torres Strait is sparsely scattered with small islands, which are almost all Australian territory because the Australian political border extends to within a few kilometres of the New Guinea coast. The administrative and shipping centre for Torres Strait is Thursday Island, which lies in the centre of a group of islands 15-30 km from the Australian mainland.

Cape York Peninsula and most Torres Strait islands have low topography and dry environments subject to severe monsoonal dry seasons, which contrast strongly with the high-rainfall, mountainous New Guinea mainland. The biota of the two land masses is also strikingly different (Walker 1972, Darlington 1971). The relatively low degree of faunal similarity between New Guinea and Australia is largely because of their very different environments and the few New Guinea species that have dispersed to Australia are largely concentrated in the small patches of rainforest on Cape York Peninsula, which function as 'islands' of NG elements in a 'sea' of Australian plants and animals (Kikkawa *et al.* 1981). The greatest concentration of New Guinea species in Australia is in lowland rainforests at Iron Range, which is on the Peninsula about halfway between Thursday Island and the Endeavour River (Monteith 1997).

There were already strict legal restrictions on the import of live animals into Australia across its international boundaries under Quarantine laws but the threat of pest animals being carried from New Guinea to the Australian mainland, by island-hopping human traffic through the Australian waters of the Torres Strait, led to quarantine zones being introduced in 1985 to prevent movement of live animals from Australian-owned Torres Strait islands to the mainland and, also, from the northern to the southern parts of the Peninsula (*Quarantine Act 1908 Sections 5(1) and 5A, Quarantine Proclamation 1998 Part 6, Division 4, Section 56A(1)*).

### **Biology and pest status of *Eurycantha* species**

The biology of *E. calcarata* was studied in the field and laboratory at Kerevat, East New Britain by Bedford (1976a, b) and observations on captive populations were given by Brock (1992, 1999) and Brock and Hasenpusch (2009). One of the present authors (CFD) has extensive experience of two *Eurycantha* species as pests of oil palm (*Elaeis guineensis* Jacquin) in two provinces of Papua New Guinea, on both the mainland (*Eurycantha insularis* Lucas, 1869) and West New Britain (*E. calcarata*).

*Eurycantha calcarata* is a large, heavy-bodied, wingless insect with females reaching about 15 cm in length and males about 12 cm (Figs 1-2). It spends the day, often close to the ground, in quiescent aggregations of mixed sex (Figs 3-4). Clusters of adults are found in daytime shelters under bark and fallen trunks or in tree holes, especially of *Kleinhovia hospita* L. (Malvaceae), and among palm inflorescences. At night, they leave day-time shelters and climb shrubs and trees to feed on foliage, where they are very conspicuous to collectors such as entomologists and herpetologists using head-mounted spotlights to search foliage. The nymphs often remain on the food plant in the daytime, relying on camouflage for protection (Fig. 9).

Because it is wingless (thus unable to find mates by flight), long-lived and gregarious, the species seldom exists in very low numbers. If it occurs in an area then it is normally conspicuous and, in West New Britain, adults are





Figs 3-4. *Eurycantha calcarata* Lucas at Namova VOP, West New Britain. (3) PNGOPRA technician Simon Makai with daytime clusters of adults found in oil palm plantation; (4) detail of adult cluster beneath piece of rotten *Kleinhovia* trunk. (Photos by C.F. Dewhurst, PNGOPRA).

commonly seen crossing roads. When disturbed, males draw attention by presenting a vigorous threat display (Fig. 5) using their enlarged hind legs armed with sharp spines (Figs 1, 6) (Bedford 1976b); they will also evert an anal gland, which produces a foul-smelling defence secretion. Females have a long beak-like ovipositor used to insert eggs into soft substrates such as moss, soil or rotten wood (Fig. 7), or they simply drop them to the ground where they look like frass (Fig. 8). The species is very different in appearance from other Australian phasmids and would readily attract the attention of field biologists if seen in Australia.

*Eurycantha calcarata* was described from 'San Georges' in the Solomon Islands (Lucas 1869) but most modern records are from the Bismarck Archipelago, particularly New Britain; no authentic specimens are in the PNG National Insect Collection from mainland New Guinea. Throughout its confirmed range, *E. calcarata* occurs in high-rainfall, lowland rainforest and adjacent plantations. It feeds on many plants in nature and has been maintained in captivity on temperate plants such as *Rubus*, *Quercus*, etc (Brock and Hasenpusch 2009). In Papua New Guinea it was first noted as an oil palm pest in West New Britain (Figs 10-11) in 1994 (PNGOPRA 1994) and was called the Oil Palm Stick Insect. It has now become an important oil palm pest, known locally in WNB as "wel kindam" (S. Makai pers. comm.). It also attacks coconut (Brock and Hasenpusch 2009), cacao (Bedford 1976a, Kumar 2001), native palms (PNGOPRA 1981), bananas, *Heliconia* and *Croton* (S. Makai pers. comm.). It is illustrated with the status of an 'exotic quarantine pest', under the common name of 'Giant Spiny Stick Insect', on the Australian Government's PaDIL website (McCaffrey 2011). The genus *Eurycantha* clearly has a propensity for palms and two other species, *E. horrida* Boisduval, 1835 and *E. insularis* have also gained pest status on oil palm in Papua New Guinea (Brock 2011, PNGOPRA 1990, 1991, 1992), with the latter a regular pest in plantations on the mainland and referred to as the 'Oil Palm Stick Insect'.

### **Reliability of the putative Australian specimens in overseas museums**

The six specimens that form the basis for the Australian distribution points for *E. calcarata* of 'Thursday Island' and 'Endeavour River' mapped by Brock and Hasenpusch (2009) are considered here. All are presumed to have been collected in the late 1800s but lack information such as dates, precise localities, collectors' names and ships' names, normally required to authenticate specimens used for significant new geographic records. At the presumed time of collection, Thursday Island, Somerset (Thursday Island's mainland predecessor as government station for Torres Strait until 1877) and Cooktown (on the Endeavour River) were the only settlements/ports in the far north of Queensland (Bolton 1963). This was an era of exploratory voyages from Australia to New Guinea by adventurers, prospectors, traders, pearl-ers and missionaries. These three settlements were frequent ports of call before





**Figs 5-7.** *Eurycantha calcarata* Lucas at Malilimi Plantation, West New Britain. (5) adult male in aggressive posture; (6) detail of spines on male hind leg; (7) adult female laying eggs into a mossy log. (Photos by C.F. Dewhurst, PNGOPRA).

and after these forays. It was also an era when showy, bizarre specimens and ethnographic items were brought back by crew and passengers who knew that wealthy European collectors and museums would pay well for them (Monteith 1987). Packages of specimens were often trans-shipped at Thursday Island or Cooktown to larger vessels bound for Europe and it is well known that these often received the locality of the port of trans-shipment rather than where they were collected. In May 1874, the British scientific ship *Challenger* spent a week at Somerset. In the expedition's final report their anthropologists bemoaned the problem of mis-attributed ethnographic items in the following terms, which highlight the confused milieu of trading which existed in these frontier ports:

*'Cape York is a sort emporium of savage weapons and ornaments. Pearl-shell gathering vessels ('pearl-shellers' as they are called) come to Somerset with crews which they have picked up at all the islands in the neighbourhood, from New Guinea, and from all over the Pacific, and they bring weapons and ornaments from all these places with them. Moreover, the Murray Islanders visit the port in their canoes, and bring bows and arrows, drums, and such things for barter. The water police stationed at Somerset deal in these curiosities, buying them up and selling them to passengers in the passing steamers, or to other visitors. Hence all kinds of savage weapons have found their way into English collections, with the label 'Cape York' (Thomson 1895, Vol 1, part 2, p. 541).*

There is no reason to believe that a similar situation did not pertain with biological specimens such as showy insects, or that the situation did not continue at Thursday Island just a few years later. Some collectors, such as the notorious John and James Cockerell (active in Torres Strait and New Guinea 1867-73), systematically mislabelled specimens because they could get a better price for exotic localities (Ingram 1986). They were bird collectors but also collected thousands of insects (Whittell 1954). Missionaries were also sending specimens and artefacts back from New Guinea mission stations. The London Missionary Society (LMS) was active in Torres Strait from 1871 and used Thursday Island as a base to service their missions in New Guinea (Lacey 1972). Queensland Museum anthropologist Michael Quinnell advises (*in litt.*) that many New Guinea artefacts and curios were erroneously labelled Thursday Island because LMS missionaries sent goods aboard the missionary vessels *Ellangowan* and *John Williams*, which plied between the various mission stations. Thursday Island was the point at which LMS goods, letters, reports etc were trans-shipped to the UK. All these factors mean that unsubstantiated records from these particular north Queensland ports from the 1800s must be treated with great caution.

#### *Specimens in the Natural History Museum, London*

The purported 'Thursday Island' records of *E. calcarata* are the four identically labelled syntypes of the synonym *E. sifia* Kirby, 1904, in the



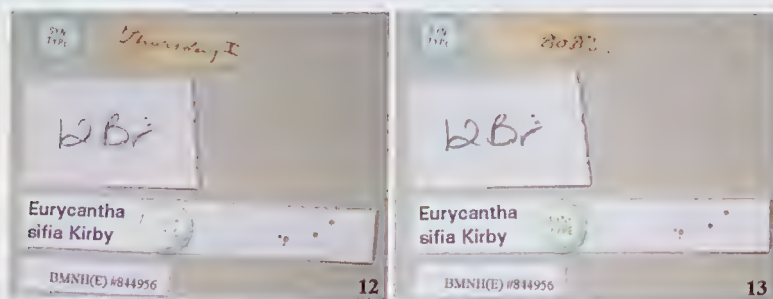


**Figs 8-11.** *Eurycantha calcarata* Lucas at Namova VOP, West New Britain. (8) egg, length 7-8 mm; (9) nymph resting on oil palm foliage in day time; (10) oil palm plantation stripped by phasmid feeding; (11) detail of phasmid feeding on oil palm leaflets. (Photos by C.F. Dewhurst, PNGOPRA).

Natural History Museum (NHM), London. The specimens and their labels were illustrated by Brock (2011), the latter reading 'Thursday I' on one side and '80.83' on the other (Figs 12-13). This code number is an NHM accession number indicating that the specimens were received in 1880 and were the 83rd accession that year (G. Beccaloni pers. comm.). Curiously, the type series of two other species of phasmids, viz. the two types of *Neopromachus sordidus* (Kirby, 1896) and the holotype of *Leprocaulinus insularis* (Kirby, 1896) are also in NHM and bear identical 'Thursday I/ 80.83' labels, in the same handwriting as those of *E. sifia*. This indicates that all three were received in the same batch of specimens in 1880. The accession number and locality are written in the same handwriting on the same label, indicating that they are not original field labels but were applied at the NHM. All three genera of phasmids in this batch are diverse in New Guinea but are not known from the Australian mainland; this sounds a warning that the whole batch may have actually originated in New Guinea.

For one of these three species (*L. insularis*), Kirby's (1896) description stated 'collected by the late Rev. R. Toy' and Brock (2011) indicated Toy as

collector for both *L. insularis* and *N. sordidus*. Robert Toy was an English missionary and naturalist based in Madagascar from 1862 to 1879, passing away on the ship home in 1880, but who never visited Torres Strait or New Guinea (London Missionary Society 1885, Southcott 2004). This seemed anomalous until, on checking the original NHM register on our behalf, George Beccaloni (pers. comm.) found that Kirby (followed by Brock) had mistakenly taken the name of Toy from the record for Accession 80.82, the line above 80.83, which indeed refers to an accession of Madagascan insects (including no phasmids) donated by Toy's widow in 1880, the year of his death. The correct data for Accession 80.83 relates to a batch of specimens from 'Thursday Island, S. New Guinea' that consisted of 13 Orthoptera, 3 Hemiptera, 2 Blattaria and 6 Lepidoptera, presented by E. Gerrard Jun[ior]. At that time phasmids were regarded as part of the Orthoptera. It should be noted that this original register entry links Thursday Island incorrectly with 'S. New Guinea', so there might have been confusion about localities at the outset for this consignment.



**Figs 12-13.** Labels of syntype of *Eurycantha sifia* Kirby in the Natural History Museum, London. (12) showing upperside of original label; (13) showing underside of original label. (Photos by Paul D. Brock, copyright NHM, London).

Edward Gerrard Jnr, who presented the phasmids to the NHM, was the principal of Edward Gerrard and Sons, a London firm which operated from 1853 to 1962 (Morris 2004). His father, Edward Gerrard Snr, was employed as an NHM taxidermist from 1841 to 1890. The firm were principally taxidermists, buying shipments of exotic skins and bones and mounting them up for sale to museums and wealthy private collectors. This was a lucrative business then and there was great competition among similar firms for choice shipments, with considerable secrecy and subterfuge about suppliers and localities (P.A. Morris pers. comm.). Gerrards also dealt in ethnographic items and supplied both Torres Strait and New Guinea items to the British Museum (S. Davies pers. comm.). A logical and feasible scenario is that Gerrards acquired a batch of poorly documented items from a supplier on Thursday Island, perhaps under similar circumstances to those tellingly described in the *Challenger* report. This shipment, when unpacked in

London, included a batch of NG insects, unwanted by Gerrards, which were then donated to the NHM, perhaps via Edward Gerrard Snr who worked there, gaining, somewhere in transit, a Thursday Island provenance in error. The Australian status of these 'Thursday I' specimens of all three phasmid species needs to be evaluated in this light, but certainly it appears to be very tenuous. Only *Leprocaulinus insularis* has any Australian credibility, through arguably conspecific nymphs being taken on Lizard Island (P.D. Brock pers. comm.). This is not the case for *E. calcarata*, the subject of this paper.

#### *Specimens in the Vienna Natural History Museum*

The Endeavour River record for *E. calcarata* is based on 'some museum specimens from Endeavour River' (Brock and Hasenpusch 2009). Paul Brock (pers. comm.) advises that these are two identically labelled specimens in the Vienna Natural History Museum (Fig. 14), which were also the basis for Redtenbacher's (1908) listing of 'Australien' for the species. Their printed labels read: 'Endeavour River, Nd. Queensland, H. Rolle, Berlin, SW 11'. Dr Martin Baehr (pers. comm.), coleopterist at the Munich Museum, advises that this label is one used by an insect dealer named Hermann Rolle (1864-1929), who operated in Berlin from 1889 until about 1921/22 when his stock passed to another dealer, E. Le Moul't, in Paris (Horn and Kahle 1937). Dr Baehr reports problems with the credibility of Herman Rolle's label data and he himself has dealt with American species of Carabidae bearing Rolle's 'Endeavour River' labels, identical to those of the phasmids (Baehr 2008). Insect dealers of that era commonly bought and resold packages of specimens of doubtful provenance brought back by travellers whose motives were often monetary rather than scientific. Clearly, the Vienna Museum specimens of *E. calcarata* have passed through commercial hands before being lodged in the museum and the veracity of the original locality is questionable.



**Fig. 14.** Forebody and label of specimen of *Eurycantha calcarata* in the Natural History Museum of Vienna. Inset shows detail of label. (Photo by Paul D. Brock).



### Could *Eurycantha* have been overlooked by modern collectors?

We have shown here that there are serious doubts about the real provenance of the 1800s specimens of *E. calcarata* with Australian labels in overseas museums. If the species does occur in Cape York Peninsula or Torres Strait, we also need to assess the likelihood that it would have been rediscovered by subsequent collectors. One of us (GBM) has spent a career as curator of the two major insect collections in Queensland (University of Queensland; Queensland Museum), has led more than 40 field expeditions to north Queensland since 1964 and has a keen interest in the history of collecting in the region (Monteith 1987).

Australia has many major insect collections, comprising millions of specimens collected over the last 150 years. Those that have significant holdings from Cape York Peninsula include the CSIRO Australian National Insect Collection (Canberra), the Queensland Museum (Brisbane), the Queensland Primary Industries Insect Collection (Brisbane and Cairns), the University of Queensland Insect Collection (now at Queensland Museum) and the AQIS/NAQS Quarantine Survey Collections (Cairns). All of these institutions have done substantial insect survey work in the Peninsula over many years. None has specimens of *E. calcarata* from Australia. The area has also been intensively collected by herpetologists and mammalogists, who use night searching with head-mounted spotlights as a standard method. None has reported the presence of *Eurycantha*.

It has been suggested that *E. calcarata* may be 'localised' near Thursday Island or the Endeavour River, which may be 'seldom visited' and 'little collected' (Australian Faunal Directory 2011). These two localities are discussed separately.

#### *Thursday Island*

Thursday Island is a tiny island 2 km in diameter and 3.5 km<sup>2</sup> in area, lying 140 km from New Guinea and 15 km off the Australian coast. It comprises low, domed hills covered with dry eucalypt forest and with just a few higher gullies having a few hectares of poor, deciduous rainforest. The island is subject to an extreme monsoonal climate and is very dry for most of the year, with no streams or natural water bodies. Its habitat contrasts strongly with the wet lowland rainforest where *E. calcarata* occurs in New Guinea. The island was used as a safe anchorage from the 1860s and became the official government administration centre for the whole of Torres Strait from 1877, with 200 pearling ships based there from 1883 into the early 1900s. It has been continuously occupied since then and today has a population of more than 2000, serviced by regular shipping and several flights per day.

Thursday Island has been the marshalling centre for numerous scientific expeditions over the years. The German biologist Richard Semon spent several weeks on Thursday Island in 1892 (Semon 1899). The Haddon

Expedition from Cambridge University worked in Torres Strait for 7 months in 1898. A notable insect collector, H.G. Elgner, visited the island many times from 1906 to 1911 and supplied thousands of specimens to Australian collectors and museums (Waterhouse and Lyell 1914, Moulds 1977). The Australian Museum biologists Cogger and Cameron worked there for weeks in the 1970s. One of the authors (GBM) has collected in the rainforest on Thursday Island on three occasions. In recent years the island has been the base for dozens of butterfly collectors monitoring New Guinea species in Torres Strait. None of these activities has revealed *Eurycantha*.

Thursday Island and the rest of Torres Strait have been subject to very intensive insect monitoring in recent years because of the dire threat of quarantine incursions of medical and agricultural pests from New Guinea. Both federal and state agencies (AQIS, NAQS, DPI, Biosecurity, etc) undertake regular surveys in the area and reference collections are maintained in Cairns. On every populated island there are indigenous quarantine officers drawn from the resident population who maintain constant watch for possible pests such as *Eurycantha*. Coconut trees, a known food plant for *Eurycantha*, are common on all islands and are regularly inspected; however, *Eurycantha* has never been located on Thursday Island or elsewhere in the Torres Strait. Even if it were there, it could not be legally transported through the Quarantine Zones to mainland Australia without appropriate permits.

### *Endeavour River*

The Endeavour River is a tiny stream only 35 km long. At its mouth is the busy town of Cooktown, founded in 1873 during a gold rush, once with 10,000 inhabitants, now with 1500. At its head, 25 km away, is the town of Hopevale, population 750. A busy road joins the two and a highway links Cooktown with Cairns; it is a shipping port and is serviced by several flights per day. More than 1000 people live in the Endeavour valley outside the towns, mostly along the stream where land has been divided into acreage blocks. The mouth of the Endeavour is a large mangrove estuary, inundated by marine tides and hostile for *Eurycantha*. The upper valley of the Endeavour River is largely grassy eucalypt forest with much heath on sand and sandstone substrates. Some strips of littoral rainforest, the only possible *Eurycantha* habitat, border the river in favourable places and these are places where most potential observers reside. The climate is strongly monsoonal with a pronounced 8-month dry season. The region does not have the orographic rain systems which bring round-the-year rain to the closely adjacent and well-studied Wet Tropics zone (Stork and Turton 2008), south of Cooktown, which does have habitats and climate amenable to *Eurycantha* but where the species demonstrably does not occur.

The Cooktown area is famous for nature-based activities and there is a high degree of local interest in natural history. There is a local natural history museum. Tour guides lead visitors on eco-tourism activities. Several local

families are famous for their knowledge, through several generations, of local fauna and regularly send specimens to the Queensland Museum. A local bushwalking club has natural history as a strong theme. For 35 years, the legendary naturalist Charles Tanner operated a fauna park beside rainforest on the upper Endeavour River and scoured the district. His property is now the residence of an experienced field biologist who frequently hosts other biologists who study the area. No one has ever reported *Eurycantha*.

The Cooktown/Endeavour River area is one of the best collected areas of Australia. The earliest intensive collecting in Australia occurred there when James Cook repaired his ship *Endeavour* there for seven weeks in 1770 and his naturalists searched the surroundings. They collected hundreds of species of insects, still preserved in London's Natural History Museum (Musgrave 1954-55). In 1982-83, CSIRO Entomology conducted several major expeditions in the Endeavour River valley to try to recollect the insects taken on Cook's visit. There have been scores of other scientific expeditions to the area over the years, collecting animals and plants for museums. Eric Mjöberg, from the Swedish Museum, spent weeks there around 1910 collecting thousands of insect specimens (Mjöberg 1916). He worked closely with aboriginals who brought him interesting specimens. If a spectacular insect such as *Eurycantha* occurred there it would have been known to the aboriginals. An expedition from Harvard University visited in 1932 and again in 1958 (Darlington 1961), concentrating particularly on ground insects that live in the same habitat that *Eurycantha* would likely occupy. The massive American Archbold Expedition, supported by staff from the Queensland Museum, spent weeks there in 1948 (Brass 1953). In more modern times, the Queensland Museum and the Australian Museum ran a series of joint expeditions to the area in the 1970s, under the first round of ABRS funding (Queensland Museum 1977). From the 1970s to the end of the 1990s, one of the authors (GBM) led numerous visits by teams of entomologists to the Cooktown area and the adjacent rainforested Bloomfield and Tribulation coastlines, as well as surveying all the rainforest tracts of Cape York Peninsula. These visits made extensive use of headlight searching at night, the best technique for finding *Eurycantha*. The area has also been the target of intense collecting by frog and reptile specialists from the Queensland Museum, the University of Queensland and James Cook University during the 1990s as part of the program of the CRC for Tropical Rainforest Ecology and Management. Herpetologists target exactly the habitats and resting situations favoured by *Eurycantha*. Untold numbers of individual biologists have also visited the Cooktown area over the years, each pursuing their own interest. No *Eurycantha* has been detected during any of this collecting.

*Eurycantha* species are known to favour palms as foodplants. The Cooktown area has the richest palm flora in Australia, with 18 well studied species (Covacevich and Covacevich 1980), but no *Eurycantha* has been reported from the area.



## Discussion

The foregoing collation of information has attempted to assess the likelihood that *Eurycantha* phasmids occur naturally on either Cape York Peninsula or the islands of Torres Strait. The following points have been made:

1. Thursday Island and Cooktown (Endeavour River) were Australian ports of call for exploratory vessels visiting New Guinea in the late 1800s. Goods trans-shipped were often attributed to the port of trans-shipment rather than the place of origin.
2. The purported 'Thursday Island' specimens of *E. calcarata* in the NHM, London have no date or collector provenance and were presented by a commercial taxidermy firm known to be dealing in New Guinea items via Thursday Island.
3. The purported 'Endeavour River' specimens of *E. calcarata* in the Vienna Museum have no date or collector provenance and passed through the hands of an insect dealer in Berlin who is known to have used the 'Endeavour River' label for specimens from other parts of the world.
4. Both Thursday Island and the Endeavour River are accessible, heavily populated areas which have been intensively collected over the 130 years since the purported original collections of *E. calcarata*, but the species has not been recollected.
5. *E. calcarata* does not naturally occur in highly localised, cryptic populations but is gregarious and conspicuous, easily located using headlights that are standard tools of modern survey biologists.
6. In New Guinea, *Eurycantha* phasmids occur in wet, lowland rainforests and plantations with rain at most times of the year. Thursday Island and Endeavour River are localities with long, stringent dry seasons and little rainforest and are not amenable to *Eurycantha*.
7. Normal biogeographic patterns for the occurrence of New Guinea rainforest elements in Cape York Peninsula is that they occur primarily in the rich lowlands of Iron Range and to a lesser extent elsewhere. The purported distribution of *Eurycantha* at the 600 km-separated, dry sites of Thursday Island and Endeavour River, but not at Iron Range, runs counter to this pattern.
8. *E. calcarata* occurs in the Bismarck Archipelago, to the east of New Guinea, with no unequivocal records from the mainland where other species of the genus occur. If a species of *Eurycantha* did occur in north Queensland it would be expected to be one of the species from the adjacent NG mainland, not *E. calcarata*.
9. *E. calcarata* has exhibited pest behaviour in several parts of Papua New Guinea, particularly on palms. If the species does occur in Australia then it is anomalous that it has not shown pest behaviour, especially in areas of high palm diversity such as Cooktown.

## Conclusion

We conclude that *E. calcarata* is not native to Australia and should be deleted from catalogues and faunal lists for the continent until such time as properly documented occurrence is demonstrated. A corollary to this is that cultures of the species being maintained in Australia for the pet trade should be regarded as illegal imports of pest potential and be terminated accordingly.

## Acknowledgements

Many people gave information, advice and help. Bill Crowe advised on quarantine regulations. Susie Davies and Michael Quinnell gave details of the 1800s ethnographic trade in Torres Strait. Pat Morris gave advice on the trading activities of Gerrard & Sons. Deane Woruba and Sharon Agavua examined specimens for us in the PNG National Insect Collection with permission of Dr Amanda Mararuai. Ken Walker provided photos from the PaDIL website. George Beccaloni gave information from the NHM registers and Judith Marshall helped locate specimens. Paul Brock read the MS and gave permission to use his photographs of museum specimens. Federica Turco helped with the illustration layouts.

## References

- AUSTRALIAN FAUNAL DIRECTORY. 2011. *Eurycantha calcarata* [Accessed 3 Sept 2011]. Available from URL: <http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/afd/taxa/14dfae35-b1a2-478a-bfcf-9065d9d13019>
- AUSTRALIAN QUARANTINE AND INSPECTION SERVICE. 2011. OSP Bulletin – May 2011 [Accessed 3 Sept 2011]. Available from URL: <http://www.daff.gov.au/aqis/import/general-info/cargo-and-shipping-news-and-activities/osp-bulletin-may-2011>
- BAEHR, M. 2008. The Australian Clivinini I. The genera *Ancus* Putzeys, *Aspidoglossa* Putzeys, *Clivinarchus* Sloane, *Platysphyrus* Sloane, *Pseudoclivina* Kult, *Rhysocara* Sloane, *Syleter* Andrewes, the subgenera *Paraclivina* Kult, *Semiclivina* Kult, and the *atrata*-, *biplagiata*-, *brevicornis*-, *coronata*-, *coryzoides*-, *cribrosa*-, *denticollis*-, *grandiceps*-, *incerta*-, *lobata*-, *obliquata*-, *obsoleta*-, *orbitalis*-, *planiceps*-, *sulciceps*-, *tranquebaria*-, and *wurargae*-groups of the genus *Clivina* Latreille. With a note on a record of the genus *Parathlibops* Basilewsky (Scapterini) (Carabidae, Scaritinae). *Coleoptera* 12: 1-220.
- BALDERSON, J., RENTZ, D.C.F. and ROACH, A.M.E. 1998. Phasmatodea. Pp 347-376, 451-456, in: Houston, W.W.K. and Wells, A. (eds), *Zoological Catalogue of Australia*. Vol. 23. *Archaeognatha*, *Zygentoma*, *Blattodea*, *Isoptera*, *Mantodea*, *Dermaptera*, *Phasmatodea*, *Embiopoda*, *Zoraptera*. CSIRO Publishing, Melbourne.
- BEDFORD, G.O. 1976a. Description and development of the eggs of two stick insects (Phasmatodea: Phasmatidae) from New Britain. *Journal of the Australian Entomological Society* 15: 389-393.
- BEDFORD, G.O. 1976b. Defensive behaviour of the New Guinea stick insect *Eurycantha* (Phasmatodea: Phasmatidae: Eurycanthinae). *Proceedings of the Linnean Society of New South Wales* 100: 218-222, pls xxiv-xxv.
- BOLTON, G.C. 1963. *A thousand miles away. A history of North Queensland to 1920*. Jacarandah Press, Brisbane; 366 pp.
- BRASS, L.J. 1953. Results of the Archbold Expeditions No 68. Summary of the 1948 Cape York (Australia) expedition. *Bulletin of the American Museum of Natural History* 102: 1-205.
- BROCK, P.D. 1992. *Rearing and studying stick and leaf insects*. Amateur Entomologists Society, Feltham, Middlesex, UK; 79 pp, 40 figs, 7 b/w pls.
- BROCK, P.D. 1999. *The amazing world of stick and leaf insects*. Amateur Entomologists Society, Orpington, Kent, UK; 182 pp, 46 figs, 26 b/w pls, 40 col pls.
- BROCK, P.D. 2011. Phasmid Species File Online. Version 2.1/4.0 [Accessed August 2011]. Available from URL: <http://phas mida.speciesfile.org>

- BROCK, P.D. and HASENPUSCH, J.W. 2007. Studies on the Australian stick insects (Phasmida), including a checklist of species and bibliography. *Zootaxa* **1570**: 1-84.
- BROCK, P.D. and HASENPUSCH, J.W. 2009. *The complete field guide to stick and leaf insects of Australia*. CSIRO Publishing, Collingwood, Victoria; 204 pp.
- BUCKLEY, T.R., ATTANAYAKE, D. and BRADLER, S. 2008. Extreme convergence in stick insect evolution: phylogenetic placement of the Lord Howe Island tree lobster. *Proceeding of the Royal Society Series B* **1552**: 1-8.
- COVACEVICH, J.M. and COVACEVICH, J. 1980. Palms in northeastern Australia II: Species from the Cooktown area. *Principes* **24**(4): 154-161.
- DARLINGTON, P.J. 1961. Australian carabid beetles IV. List of localities, 1956-58. *Psyche, Cambridge* **67**: 111-126.
- DARLINGTON, P.J. 1971. The carabid beetles of New Guinea. Part IV. General considerations, analysis and history of the fauna; taxonomic supplement. *Bulletin of the Museum of Comparative Zoology* **142**: 129-337.
- HERWAARDEN, L.C.M. van, 1998. A guide to the genera of stick- and leaf-insects (Insecta: Phasmida) of New Guinea and the surrounding islands. *Science in New Guinea* **24**(2): 55-115.
- HORN, W. and KAHLE, I. 1937. Über entomologische Sammlungen, Entomologen & Entomomuseologie (Ein Beitrag zur Geschichte der Entomologie). *Entomologischen Beihefte Berlin-Dahlem* **2-4** (1935-1937): 1-536, tables I-XXXVIII.
- INGRAM, G.J. 1986. Scales, feathers and fur. Pp 151-171, in: Mather, P. (ed.), A time for a museum. The history of the Queensland Museum 1862-1986. *Memoirs of the Queensland Museum* **24**: 1-365.
- KEY, K.H.L. 1991. Phasmatodea. Pp 394-404, in: CSIRO, *The insects of Australia. A textbook for students and research workers*. 2nd Ed., 2 vols, Melbourne University Press, Melbourne; 1137 pp.
- KIKKAWA, J., MONTEITH, G.B. and INGRAM, G. 1981. Cape York Peninsula - the major region of faunal interchange. Pp 1695-1742, in: Keast, A. (ed.), *Ecological Biogeography in Australia*. Junk, The Hague.
- KIRBY, W.F. 1896. On some new or rare Phasmidae in the collection of the British Museum. *Transactions of the Linnaean Society of London* (2) **6**(6): 447-75, pl. 39-40.
- KIRBY, W.F. 1904. Notes on Phasmidae in the collection of the British Museum (Natural History) South Kensington, with descriptions of new species. Nos I and II. *Annals and Magazine of Natural History* **7**(13): 372-377, 429-449.
- KUMAR, R. 2001. *Insect pests of agriculture in Papua New Guinea. Part 1. Principles and practice; pests of tree crops and stored products*. Science in New Guinea, Waigani; 723 pp.
- LUCAS, H. 1869. Notes. *Annales de la Société Entomologique de France* **4**(9): xxv.
- LACEY, R.J. 1972. Missions. Pp 772-782, in: Ryan, P. (ed.), *Encyclopedia of Papua and New Guinea*. Vol 3. Melbourne University Press, Melbourne.
- LONDON MISSIONARY SOCIETY. 1885. *The Antananarivo annual and Madagascar magazine 1875 -1878*. London Missionary Society Press.
- McCAFFREY, S. 2011. *Eurycantha calcarata* [Accessed Sept 7 2011]. Available from URL: <http://padil.gov.au:80/pests-and-diseases/Pest/Main/141537>
- MJÖBERG, E.G. 1916. *Bland Stenåldersmänniskor i Queenslands Vildmarker*. Albert Bonniers Förlag, Stockholm; 584 pp.



- MONTEITH, G.B. 1987. History of biological collecting at Cape York, Queensland 1770-1970. *Queensland Naturalist* 28(1-4): 42-51.
- MONTEITH, G.B. 1997. Revision of the Australian flat bugs of the subfamily Mezirinae (Insects: Hemiptera: Aradidae). *Memoirs of the Queensland Museum* 41(1): 1-169.
- MORRIS, P.A. 2004. *Edward Gerrard and Sons: a taxidermy memoir*. MPM Publishing, Ascot (UK); 128 pp. ISBN 0-9545596-1-4.
- MOULDS, M.S. 1977. *Bibliography of Australian butterflies (Lepidoptera: Hesperioidea and Papilionoidea) 1773-1973*. Australian Entomological Press, Greenwich, NSW; 239 pp.
- MUSGRAVE, A. 1954-55. Insects of Captain Cook's expedition. Parts 1-IV. *Australian Museum Magazine* 11: 265-269, 303-306, 322-324, 337-339.
- PNGOPRA 1981. *Annual Report of the Papua New Guinea Oil Palm Research Association for 1981*. PNGOPRA, Kimbe, Papua New Guinea; 44 pp.
- PNGOPRA 1990. *Annual Report of the Papua New Guinea Oil Palm Research Association for 1990*. PNGOPRA, Kimbe, Papua New Guinea; 292 pp.
- PNGOPRA 1991. *Annual Report of the Papua New Guinea Oil Palm Research Association for 1991*. PNGOPRA, Kimbe, Papua New Guinea; 132 pp.
- PNGOPRA 1992. *Annual Report of the Papua New Guinea Oil Palm Research Association for 1992*. PNGOPRA, Kimbe, Papua New Guinea; 138 pp.
- QUEENSLAND MUSEUM. 1977. *Fauna of eastern Australian rainforests II: preliminary report on sites surveyed by the Queensland Museum in southeastern and far northeastern Queensland, with additional results from sites surveyed previously in northeastern Queensland*. Queensland Museum, Brisbane; 105 pp.
- REDTENBACHER, J. 1908. Phasmidae Anareolatae. (Phibalosomini, Acrophyllini, Necrosiini). Pp 341-589, pls. 16-27, in: Brunner von Wattenwyl, K. and Redtenbacher, J. (eds), *Die insektenfamilie der Phasmiden. Vol 3*. Verlag Engelmann, Leipzig.
- SEMON, R. 1899. *In the Australian bush and on the coast of the Coral Sea*. MacMillan & Co., London; 552 pp.
- SOUTHCOTT, J. 2004. The first Tonic Sol-fa missionary: Reverend Robert Toy in Madagascar. *Research Studies in Music Education* 23: 1-15.
- STORK, N.E. and TURTON, S.M. 2008. *Living in a dynamic tropical forest landscape*. Blackwell Publishing Ltd., Carlton, Victoria; 632 pp.
- THOMSON, C. Wyville. 1895. *Report on the scientific results of the voyage of the HMS Challenger during the years 1872-76*. 2 vols. H.M. Government, London; 1607 pp.
- VICKERY, V.R. 1983. Catalogue of Australian stick insects (Phasmida, Phasmatodea, Phasmatoptera or Cheleutoptera). *CSIRO Division of Entomology Technical Paper* No 20, 19 pp.
- WALKER, D. 1972. *Bridge and barrier: the natural and cultural history of Torres Strait*. ANU School of Pacific Studies, Publication BG/3; 437 pp.
- WATERHOUSE, G.A. and LYELL, G. 1914. *The butterflies of Australia*. Angus & Robertson, Sydney.
- WHITTELL, H.M. 1954 *The literature of Australian birds: a history and bibliography of Australian ornithology*. Paterson Brokensha, Perth; 788 pp.